AMATEUR SATELLITE REPORT

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Chairman John Browning, W6SP, Resigns

Citing increasing personal business requirements, AMSAT's Chairman of the Board of Directors, John Browning, W6SP, submitted his resignation on February 6. He had been Chairman since 1980 and was afforded a special *ASR* Spotlight in its First Anniversary edition (*ASR* # 26, February 8, 1982).

A native of West Virginia and a retired Air Force Colonel with the Distinguished Service Medal, John led AMSAT through its middle years. He leaves it healthy and prepared to begin its next phase of growth leading to the Phase 4 era and multiple PACSAT capabilities.

We all owe him a debt of thanks for his efforts and *ASR* hopes many AMSAT members will take a moment out from their own busy schedules to send W6SP a short note or QSL to acknowledge his efforts:

John Browning, W6SP
6202 Lochvale Drive
Rancho Palos Verdes, CA, 90274

In accord with the Bylaws, the resignation becomes effective thirty days from the date of submission whereupon the First Alternate Director John Henry, VE2VQ, will be seated as a voting Director. Andy MacAllister then becomes First Alternate.

Surrey To Build New UoSAT For 1988 Launch

by Dr. Martin Sweeting, G3YJO, University of Surrey

The UoSAT Spacecraft Engineering Research Unit at the University of Surrey (UK) is now building a third UoSAT OSCAR spacecraft: UoSAT-C. NASA has agreed to provide a launch for UoSAT-C on a DELTA launch vehicle currently scheduled for late 1988. The DELTA should place UoSAT-C into a 43 degree inclination, 500 km circular orbit.

UoSAT-C will carry experimental engineering, science and communications payloads developed in close collaboration between international professional engineering and Amateur Radio communities. These payload experiments develop further the mission objectives supported by the highly-successful UoSAT-1 & 2 (UoSAT OSCAR-9 and UoSAT OSCAR-11) satellites which are still operational after six and four years in orbit respectively. The UoSAT Program and series of satellites are intended to complement the AMSAT OSCAR, RS and FUJI OSCAR Amateur Radio communications satellites. They provide a space science and engineering facility readily available to both amateur and professional experimenters. Greater mutual awareness and collaboration are thus promoted.

In common with prior UoSAT missions, UoSAT-C will have a strong element of international collaboration - specifically with members of AMSAT-UK, AMSAT-NA in the US and Canada, VITA, Quadron, NASA, the British National Space Center and the European Space Agency.

UoSAT-C PAYLOADS

Store-&-Forward Communications:

Since 1983, UoSAT has played a major role in an international collaborative project developing cost-effective digital store-&-forward satellite communications techniques. The UoSAT OSCAR-11 Digital Communications Experiment (DCE) — funded by the Volunteers In Technical Assistance (VITA) and built by VITA/AMSAT volunteers in the USA, UK and Canada - provided the first operational tests of store-&-forward PACSAT communications within the Amateur Satellite Service. Drawing on the operational and engineering data gained from the DCE, UoSAT and VITA are developing a high performance digital store-&-forward communications payload specially tailored for use by inexpensive ground stations. To test this payload, UoSAT-C will carry the PACSAT Communications Experiment (PCE). The PCE will be openly accessible to Radio Amateurs operating in the 2m and 70cm bands (Mode J). VITA is seeking additional frequency allocations outside the amateur bands to allow limited use of the UoSAT-C PCE by VITA ground stations in remote areas to provide technical assistance and disaster relief.

Radiation Studies Experiments:

Microprocessor-controlled payloads such as the PCE cannot be built without VLSI semiconductors, and most recent and affordable VLSI devices have not yet been tested for space use. UoSAT-C will host several experimental payloads

studying the effects of the space radiation environment on VLSI devices:

Cosmic Particle Experiment (CPE)

comprising an array of large-area PIN diodes, will detect energetic particles which cause single event upsets (SEUs) in VLSI circuits (such as high-density RAMs).

CCD Single Event Upset Experiment

(CCD-SEU) comprising an enclosed Charge-Coupled Device (CCD) array, will detect energetic cosmic particles and evaluate the effect of SEUs on CCD imagers. This data is of particular importance for scientists using sensitive CCDs as star sensors.

Total Dose Experiment (TDE)

using special FETs located around the spacecraft, will measure the total radiation dose accumulated by the on-board subsystems and payloads. These dose measurements will allow engineers to assess the shielding properties of the spacecraft structure, and to correlate changes in LSI-device power consumption and performance with total radiation dose.

Satellite Technology Experiments:

UoSAT-C will carry a range of satellite technology experiments associated with power systems, on-board data handling (OBDH), attitude determination, control & stabilization (ADCS) and RF modulation.

POWER:

The spacecraft will be powered from GaAs solar cells and will include experimental patches of novel GaAs, InP and Si solar cells with a variety of newly-developed cover-slides. The performance of these cells will be monitored throughout the mission as a function of radiation dose. The spacecraft onboard computers will constantly monitor and adjust the Battery Charge Regulator and Power Conditioning Module to optimize power conversion and storage efficiency.

OBDH:

UoSAT-C will include several computers. In addition to the primary RCA1802 on-board computer (OBC-1) running DIARY-type software, there will be a more powerful 80C86-based OBC-2 supporting complex attitude control algorithms and spacecraft data networks. Four TRANSPUTERS in a parallel-processing array will be available for highly sophisticated on-board image and data processing, and the PCE will employ an 80C186-family computer to manage high-speed communications links and several megabytes of RAM.

A wide range of memory devices using different technologies and architectures will make up a total on-board capacity of around 5 megabytes of RAM. The radiation-induced effects on the processors and associated memories will be monitored and evaluated throughout the lifetime of the spacecraft. The network of computers on UoSAT-C will make this spacecraft the most computationally powerful of its class and will support demanding experiments in advanced spacecraft attitude determination and control, data communications and image processing.

ADCS:

The 43 degree inclination, non-sun-synchronous nature of the UO-C orbit will necessitate the use of new attitude determination and control mechanisms to maintain accurate Earth-pointing. In addition to more complex attitude control algorithms executed by OBC-2, improved analogue and digital sun sensors and Earth horizon sensors are being developed at UoS for the mission.

DSP:

If time and resources permit, a Digital Signal Processing Experiment may be included on UO-C to evaluate modulation/demodulation schemes.

A new concept of highly modular construction has been developed and is under test for UoSAT-C. This new, modular structure should result in much improved utilization of the available spacecraft envelope, greater ease of assembly and integration, and allow a more rapid response to future launch opportunities.

FOR THE USERS

Like UO-9 and UO-11, UoSAT OSCAR-C will support a world-wide user community of engineers, scientists, educators and communicators. If all goes according to plan, UO-C will provide spacecraft housekeeping telemetry, long-term telemetry surveys, results from on-board experiments, news bulletins and communications facilities on a single downlink through packet-radio techniques. We will finalize and publish communications modem and protocol details as soon as possible, to allow groundstations to equip themselves.

Whilst numerous international teams are already collaborating on UO-C, UoSAT is interested in hearing from others interested in possible collaboration, especially in the area of user groundstation support.

The UoSAT team are happy to be able to make a public announcement of the UoSAT-C mission, and we hope that it will contribute to the long history of successful and technically important OSCAR and RS missions and maintain the tradition of international collaboration in the Amateur Satellite Service.

Next Ariane Launch Now March 11

According to Arianespace, the next launch from Kourou, French Guiana, will be the V-21 mission now scheduled for launch March 11. The launch was most recently scheduled for March 4 but was slipped one week to allow for modification of one of the payload satellites. V-21 will carry SPACENET IIIR/GEOSTAR R01 and TELECOM 1C.

AMSAT's Phase 3C is aboard the V-22 mission which appears on track for a late May or early June launch. Launch activities of V-21 and V-22 can proceed essentially independent of each other since they will be launched from different pads.

Progress On Skitrek/Nordski

by Rich Ensign, N8IWJ
AMSAT Science Education Advisor

Progress Report #3
12Feb88

Preparations continue for the Transpolar Skitrek Expedition as the UoSAT OSCAR 11 Spacecraft is undergoing memory tests. Data is being read into and then read out of memory to check the integrity of each memory cell. The tests will run from February 11th through February 18th. During this time it is unlikely Digitalker tests will be run.

Four Canadian Amateur Radio operators will be running the support base communications from Resolute Bay on Cornwallis Island in the Northwest Territory of Canada. They are:

Bill Hardie, VE3EFX.....from February 23rd through March 12th
Andy McLellan, VE1ASJ....from March 4th through March 19th
Don Whitty, VO1QF.....from March 15th through March 26th
Glen Wyant, VE3ICR.....from March 22nd through April 2nd

These hams will be operating on the 20, 40 and 80 meter bands under their own calls or the Resolute Support Base call CI8C. All are active DX'ers and will appreciate a QSO with you. Remember their critical role in the expedition as you attempt contacts with them. If you make contact, QSL via Box 313, Don Mills, Ontario, M3C 2S7.

Barry Garratt, VE3CDX/VE8CDX and Rick Burke, VO1SA, will be representing the Canadian communications team in Russia. Rick will be working from the Sredny Island Base (Call is EKØQCG) and Barry will be working from the North Pole 28 Ice Island Base (Call is 4KØDCG). Moscow calls associated with the expedition are UA3HR, UK3KP and RK3KP. Canadian calls associated with the expedition are VE3AUM in Ottawa and VE3CDM in Toronto.

It is unlikely that you will hear the actual expedition on the ice but, in case you get lucky, their call in Russian jurisdiction is UKØCI and in Canadian jurisdiction is CI8UA. DO NOT ATTEMPT TO MAKE CONTACT WITH THEM. Their radio is the skiers lifeline and they must have clear communications with the support bases in order to preserve their communications capability with limited battery life.

The four Canadian skiers have now left for Russia. Much of the information in this report comes from Tom Atkins, VE3CDM, who has just returned from very productive planning meetings in Moscow. Please note that the Sredny Island call is in error in the SKITREK Educator's guide and is correct as listed here.

Skitrek Progress Report #4
19Feb88

Preparations for the Transpolar Skitrek Expedition are moving into high gear both in Russia and in Canada. The Canadian skiers have traveled north to Dixon and Severnaya Zemlya for final training. Dr. Matthew Buxton and Christopher Holloway, the last two Canadian skiers chosen, have not trained with the Russian skiers before so this period is critical for them. Dr. Dimitri Shparo, expedition leader, will be taking a close look at all skiers' readiness and physical condition before announcing the final eleven to fourteen person group to make the trek.

In Canada, Tom Atkins, VE3CDM/VE8CDM, Barry Garratt, VE3CDX/VE8CDX and Bill Hardie, VE3EFX are preparing to make the long plane trip on February 23rd from Montreal to Resolute Bay, N.W.T., the Canadian Communications Support Base. The donated ICOM HF transceivers are now being checked out prior to their installation at Resolute. Tom and Barry will be returning south as soon as the station is in operation to prepare for Barry's and Rick Burke's trip to Russia, again carrying along ICOM HF gear for the Russian Support Bases at Severnaya Zemlya and the Ice Island North Pole 28.

Andy McLellan, VE1ASJ, who will be operating the Support Base from March 4th through March 19th, reports that he will be working through the Amateur Radio Satellite RS 10/11 while at Resolute. Watch for more on this in the next Progress Report.

Resolute Support Base operators will be keeping a weather log for us which will periodically appear in future progress reports. Barry and Rick will keep similar logs for us as well. Since information will be scant from the skiers we can infer their weather by interpolating information we receive from Resolute, North Pole 28 and Severnaya Zemlya. Rick will be traveling to Severnaya Zemlya the first week in March and Barry will be leaving the second week in April for North Pole 28.

This week, the Digitalker on UoSAT OSCAR 11 is again being tested in accord with the schedule presented in Progress Report #1. The message says:

"Hi! Hi! 73 from UoSAT 2. See you again. 32NL."

32NL is, of course, a possible way of saying 32 degrees north latitude. Perhaps the easiest and most effective way of receiving the Digitalker is with an HT and whip antenna that can be freely oriented for best reception. Lengthy periods of nearly full-quieting signal can be obtained when the satellite is only 25 degrees above your horizon.

You can receive a UoSAT QSL card by sending your detailed report of Digitalker reception to: UoSAT Spacecraft Engineering Research Unit, University of Surrey, Guildford, Surrey GU2 5XH, England. The CRRL is only QSL'ing contacts with Resolute as reported in Progress Report #3.

A continuing series of Progress Reports may be accessed via packet BBS, AMSAT Nets and the main educator source, the WØRPK AMSAT Bulletin Board (1-515-961-3325). Comments and questions about the reports should be addressed to Rich Ensign, 421 N. Military, Dearborn, MI 48124, U.S.A.

Short Bursts

• Mir watchers in the Denver area report having seen a close companion to the Russian Mir space station February 9 according to AMSAT Regional Coordinator Jack Crabtree, AAØP. At first it was thought the companion was a Progress cargo ship but this has been disputed. A strong glint from the Mir companion lasting 1 to 2 seconds may indicate solar panels and slow rotation. Meanwhile the National Space Society has established a "Mir Watch" hotline which provides observation window predictions for major cities. The telephone number is 202-546-6010.

Three Satellites Lost As Soviet Rocket Misfires

With Soviet officials pressing commercial launch opportunities aboard their Proton rocket for all paying customers, what they didn't need was another launch failure. Unfortunately that's just what they got February 18 when the third Proton failure in 13 months took three satellites to an early demise. Some debris reportedly reentered near Australia. The failure has been attributed to a faulty fourth stage. The fourth stage was also cited as the cause for the prior two losses.

As embarrassing as the failure is, however, space analysts say it is of no major consequence since low earth orbiting satellites don't require the defective fourth stage. The satellites lost last week were being lofted into a higher orbit and were believed to be navigation type satellites. Moreover, Glavcosmos, the Soviet commercial launch managing agency recently announced a West German concern has signed up for three materials processing flights beginning in 1989. Commercial inroads by Glavcosmos are expected to be unaffected by this latest Proton failure says James Oberg, a leading American space authority. The Soviet has been trying to market its launch services in the U.S. through a Houston firm and has been advertising recently in *Aviation Week* magazine.

Meanwhile, the Chinese Long March launcher has apparently captured the interest of Australian authorities who are reportedly discussing launch of future Australian communications satellites with the Chinese. With the U.S. now emphasizing its re-emerging expendable launchers with a number of new commercial ventures, the European Space Agency again picking up momentum, the Soviets and Chinese competing for customers, the picture that is emerging is one of fierce competition for launch customers in the waning years of this decade and beyond. The question seems to be if a launch capacity surplus will emerge in the next few years much as a C-Band satellite capacity emerged a few years ago. AMSAT's prospects for a Phase 4 satellite would obviously be enhanced with a launch capacity surplus.

New FO-12 Operating Schedule Announced

JARL has announced the new FO-12 operating schedule as follows:

Mode	From (UTC)	Mode	From (UTC)	Mode	From (UTC)
JD	Mar/ 1 05:31	D	14 01:55	JD	23 04:01
DI	2 04:36	JD	17 05:22	DI	24 05:09
JD	5 01:53	DI	18 06:30	JD	26 03:21
D	6 03:01	JD	19 03:33	D	27 04:28
JA	8 01:13	DI	20 04:42	JA	30 01:46
D	9 04:25	JD	21 03:47	D	31 02:54
JA	12 01:41	DI	22 04:55		

Mode JA : Linear Transponder
Mode JD : Mailbox
Mode D : Charging mode
Mode D : Charging mode with CPU/MEMORY kept ON

The transponders will be off at other times. This schedule may be changed at any time due to unexpected power situations.

** Note: On February 25 from 3:55 through 5:57 UTC, a special telemetry software package will be loaded to permit telemetry transmission every 2 seconds instead of every minute. No mailbox functions will be available during this period but the digipeater will be operational. Reports of received telemetry will be appreciated. Please send them to JARL(JJ1ZUT) via the FO-12 mailbox.

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NASA's space program will get a substantial boost in the 1989 federal budget submitted by President Reagan to the Congress last week. Included in the $11.5 billion for NASA is about $1 billion for a space station and $2 billion for space shuttle flights and a new orbiter to replace the lost Challenger.

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